



Psychological distress as a mediator of the relationship between childhood maltreatment and sleep quality in adolescence: Results from the Maltreatment and Adolescent Pathways (MAP) Longitudinal Study[☆]

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ARTICLE INFO

Article history:

Received 11 March 2014

Received in revised form 8 July 2014

Accepted 10 July 2014

Available online 30 July 2014

Keywords:

Child maltreatment
Psychological distress
Sleep disturbances
Mediation
Adolescence

ABSTRACT

Childhood maltreatment represents an important public health concern, as it is often associated with a host of negative outcomes across development. In recent years, researchers have begun to examine the link between negative health-related behaviors and history of childhood maltreatment. The current study considers the relationship between history of childhood maltreatment and sleep disturbances in adolescence. Further, the role of psychological distress is considered as an explanatory link between childhood maltreatment and adolescent sleep disturbances. The current study is a secondary analysis using a subsample ($N = 73$) of child welfare-involved youth who participated in the initial and 2-year time-point of the Maltreatment and Adolescent Pathways (MAP) Longitudinal Study on the variables of interest. Youth reported on lifetime maltreatment experiences, psychological distress, and sleep disturbances, in addition to the other measures administered as part of the larger MAP study protocol. More severe childhood maltreatment was related to increased sleep disturbances during adolescence, and psychological distress was a significant mediator of the childhood maltreatment-adolescent sleep disturbance association. The results demonstrate that a history of childhood maltreatment represents a risk factor for sleep disturbances in adolescence. The findings highlight the importance of inquiring about health-related behaviors in child welfare youth and the need to promote psychological well-being within this population.

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[☆] We acknowledge the MAP Research Team and thank them for the secondary analyses use of this database. MAP (Maltreatment and Adolescent Pathways) Longitudinal Study principal investigator: Christine Wekerle; co-investigators, alphabetically: M. Boyle, D. Goodman, B. Leslie, E. Leung, H. MacMillan, B. Moody, N. Trocmé, R. Waechter, and A-M. Wall (deceased); collaborators: Child Welfare League of Canada, First Nations Child and Family Caring Society of Canada, Ontario Association of Children's Aid Societies. We thank the youth participants, MAP advisory board and community agencies, and the MAP research support staff. The MAP Longitudinal Study is funded by the Canadian Institutes of Health Research (CIHR; No. VGH63212; NO. 74547), Institute of Gender and Health (IGH), the Provincial Centre of Excellence in Child and Youth Mental Health at the Children's Hospital of Eastern Ontario (No. 341), and the Ontario Ministry of Children and Youth Services (No. 124). Dr. Wekerle's work was supported by a mid-career award from CIHR IGH and the Ontario Women's Health Council (No. 100079), and an Interchange Canada Assignment to the Public Health Agency of Canada. Dr. Weiss' work was supported by a new investigator fellowship from the Ontario Mental Health Foundation.

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Introduction

Childhood maltreatment is a serious public health concern, associated with a myriad of negative sequelae across the life-span, including short-term and long-term consequences related to physical (e.g., adverse physical health outcomes; [Hager & Runtz, 2012](#)), emotional (e.g., emotion dysregulation; [Kim & Cicchetti, 2010](#)), cognitive (e.g., poor executive functioning; [Beers & De Bellis, 2002](#)), social (e.g., dysfunctional romantic relationships; [Wekerle et al., 2009](#)), and behavioral (e.g., aggression; [Kotch et al., 2008](#)) functioning. To date, research has largely focused on mental health outcomes associated with childhood maltreatment (e.g., depression, suicide ideation/attempts, anxiety; [Bolger & Patterson, 2001](#); [Fergusson, Boden, & Harwood, 2008](#); [Flett, Druckerman, Hewitt, & Wekerle, 2012](#); [Rhodes et al., 2013](#); [Tanaka, Wekerle, Schmuck, Paglia-Boak, & The MAP Research Team, 2011](#)); however, emerging evidence suggests that childhood maltreatment has long-term detrimental consequence for health and health-related behaviors that have a known impact on health outcomes ([Chartier, Walker, & Naimark, 2010](#); [Hussey, Chang, & Kotch, 2006](#)). Despite this accumulating support, significant gaps in the literature exist, particularly with respect to poor health and health-related behaviors during the adolescent period and an understanding of the mechanisms through which childhood maltreatment is translated into such outcomes. There is a particular lack of knowledge with respect to the welfare of youth with histories of maltreatment that are receiving social services. Child welfare-involved youth represent a specific sample in which the maltreatment tends to be clearer (i.e., validated child protection cases) than in a community or a national sample. Additionally, child welfare youth receive services longitudinally and, within Ontario, child welfare organizations are mandated to both protect the safety of the child and to promote their well-being. With this in mind, the purpose of the current study was to examine the mediating role of maltreatment-related psychopathology (i.e., psychological distress) on the relationship between severity of childhood maltreatment and negative health indicators, namely sleep disturbances, in urban youth involved in child protection services.

A growing body of research has provided support for the negative long-term physical health consequences of childhood maltreatment, although the majority of research examining poor physical health outcomes in individuals with a history of childhood maltreatment has focused almost exclusively on adult populations. For instance, the adult literature has identified links between a history of childhood maltreatment and increased engagement in risky sexual behaviors, substance abuse, poor self-reported health, multiple medical problems, and higher levels of health care utilization ([Chartier et al., 2010](#); [Rodgers et al., 2004](#)). To a lesser extent, the literature contains studies examining the association between childhood maltreatment and behaviors that pose a risk to physical health in adolescence. Adolescence is an important developmental stage in which to understand risk factors for poor health and health-related behaviors in individuals with a history of childhood maltreatment as health-related habits, values, and lifestyles formed during adolescence often endure across the lifespan and, consequently, have long-term implications for health and well-being ([Maggs, Schulenberg, & Hurrelmann, 1997](#)). As such, a health-risk construct that may emerge during adolescence, and has known repercussions for health outcomes across the lifespan, is sleep problems.

Sleep Disturbances

Sleep represents an important marker of physical health-related functioning, essential for maintaining optimal health and functioning, particularly during adolescence when important processes of growth and maturation take place ([Dahl & Lewin, 2002](#)). Poor sleep is related to a host of negative health outcomes in adolescents, including depression and poor cognitive and social functioning ([Carskadon, Acedbo, & Jenni, 2004](#); [Fredriksen, Rhodes, Reddy, & Way, 2004](#)).

Within the maltreatment literature, few studies have examined the association between history of maltreatment and sleep, particularly with respect to the long-term influences of maltreatment on sleep problems. Several studies have provided support for a more proximal link between childhood abuse and a greater number of sleep disturbances in childhood ([Glod, Teicher, Hartman, & Harakal, 1997](#); [Sadeh et al., 1995](#)). In terms of adult outcomes, a study by [Greenfield, Lee, Friedman, and Springer \(2011\)](#) found that adults with a history of abuse were at an elevated risk for sleep problems. Similarly, a study conducted using a large sample of adults from Finland found a strong association between childhood adversities and quality of sleep in adulthood ([Koskenvuo, Hublin, Partinen, Paunio, & Koskenvuo, 2010](#)). A recent retrospective study found support for a link between adverse childhood experiences suggestive of child maltreatment (e.g., physical abuse, sexual abuse, and witnessing domestic violence) and frequent insufficient sleep in adulthood ([Chapman et al., 2013](#)). [Noll, Trickett, Susman, and Putman \(2006\)](#) found support for a prospective link between child welfare-involved girls with a history of childhood sexual abuse ($n = 78$) and an increased likelihood of reporting sleep problems in adolescence. Thus, research to date provides some evidence for a positive association between childhood maltreatment and subsequent sleep problems, although the way in which this relationship unfolds during the adolescent period is not well understood.

Pathway from Childhood Maltreatment to Health Outcomes

The literature that has examined the maltreatment-health relationship has strongly recommended future research to consider the role of mediators, such as maltreatment-related psychopathology, in order to better understand the pathways through which childhood maltreatment leads to subsequent health outcomes across development ([Greenfield et al., 2011](#); [Noll et al., 2006](#); [Shin & Miller, 2012](#)). Psychological distress, including experiences of depression, anxiety, and PTSD, is a construct that has repeatedly been associated with a history of childhood maltreatment ([Grassi-Oliveira & Stein, 2008](#);

Wright, Crawford, & Del Castillo, 2009) and negative health outcomes, such as poor sleep (Phelan, Love, Ryff, Brown, & Heidrich, 2010). More specifically, extant research looking at mechanisms has found support for a relationship between childhood maltreatment and poor health outcomes transmitted through symptoms of PTSD in adult women (Lang et al., 2008); however, it is unknown how such a relationship would unfold in adolescence. Further, there may be a degree of overlap between symptoms of mental health and physical health, such as in the case of PTSD and sleep problems, as sleep disturbance marks one of several possible criteria in the diagnosis of PTSD. In this case, rather than examining independent measures of various psychological symptomatology, it is advantageous to use a more global measure of psychological distress, which incorporates information on a number of psychological symptoms, in order to reduce the overlap in constructs. Taken together, determining the mechanisms responsible for the maltreatment-sleep disturbance association is an important step in determining interventions to promote health-related behaviors in vulnerable adolescents.

Current Study

The current study aimed to clarify the relationship between past recollections of childhood maltreatment (assessed at the initial time-point between 14 and 17 years of age) and subsequent adolescent sleep quality (introduced within the 2-year time-point testing based on MAP Advisory Board members' identifying it as an emergent issue for practice; as such not all 2-year study participants received the form to complete). The maltreatment-sleep dysfunction relationship will be considered in terms of the mediating role of recent aspects of psychological distress (also assessed at the initial time-point) and is the first to do so in a diverse sample of youth presenting with multiple forms of childhood maltreatment and using a longitudinal design. We hypothesized that there would be a significant link between severity of childhood maltreatment and sleep disturbances and that psychological distress would mediate this relationship.

Methods

Participants

The present study used data from the Maltreatment and Adolescent Pathways (MAP) Longitudinal Study, a longitudinal study of Child Protection Services (CPS)-involved youth that collected data in 2002–2010. The initial recruitment rate of eligible youth was approximately 70%, with the majority of youth declining participation in the study because they were "too busy." A total of 561 youth between the ages of 14 and 17 years ($M = 15.8$, $SD = 1.1$; 47.1% boys) completed initial testing. A diversity of ethnic groups were represented in the MAP Longitudinal Study, with the most common ethnicity being White (30.5%), followed by dual- or multiple-ethnicity (28.0%), and Black (26.1%). With respect to CPS status, the majority of youth (approximately 61%) were identified as Crown Wards, in that they were receiving out-of-home care and legally severed from their parents. At the initial time-point, all youth in the MAP Longitudinal Study were active in receiving services for 6 months or longer, meaning that they were assigned their own caseworker with mandated visits every 90 days. Further, in-home youth were also assigned a family caseworker as well as additional specialty services. Those youth who were Crown Wards had additional support services in out-of-home care and financial supports. Youth residing in a group home received additional support from the group home staff.

The overall MAP procedures involved initial data collection, followed by testing every 6 months for a 3-year period post recruitment into the study (e.g., initial, 6 month, 1 year, 1.5 year, 2 year, 2.5 year, and 3 year). Potential participants were recruited through three CPS agencies in a large, diverse urban center, which accounts for 95% of the child welfare caseloads. Specifically, a master list of all active caseloads of youth aged 14–17, containing minimal information, was provided to the research team. Participants were selected via a random numbers table, a method of random selection. Lists of randomly selected youth were provided to the CPS staff members who were serving as liaisons for the MAP Longitudinal Study. The CPS liaisons and caseworkers then assessed each randomly selected case based on a set of predetermined exclusion criteria. Specifically, cases were deemed ineligible based on the following: (a) brief case openings and (b) limited case information provided to the research team on the CPS agency master list (e.g., limited to only youth date of birth, caseworker). Other exclusion criteria implemented at the CPS screening stage included: being outside the initial age range for recruitment (aged 14–17), having a significant developmental delay, absent without leave, and considered to be in crisis (e.g., suicidal, experiencing psychotic episodes). Ultimately, youth needed to be able to participate in a 2-h assessment over time. These selection criteria eliminated 58% of those youth randomly selected initially. Of the youth who passed the CPS initial screening, those youth who remained CPS active and had their case open for 6 months or longer were able to participate in the MAP Longitudinal Study. Youth received \$28 for their participation and were offered refreshments. The CPS agencies continually provided research staff with updated master lists every 6 months. All participating CPS agencies and university research ethics boards granted ethical clearance for the MAP Longitudinal Study. Youth who were aged 16 and older were permitted to provide their own consent, and youth under the age of 16 were required to have a legal guardian provide consent.

The MAP Study was guided by a participatory action research (PAR; Baum, MacDougall, & Smith, 2006) model that engaged caseworkers and supervisors as the participants who would be in the best position to action the emergent findings. The Advisory Group met monthly and co-determined study questionnaires, methods, and clinical protocols toward serving the best interests of the youth. On-going research ethics approval was obtained at the CPS agency level, as well as at the university and hospital ethics boards of investigators involved. Given this PAR model, responsiveness was provided to the

Table 1
Descriptive statistics.

Variables	M (SD) or N (%) for categorical variables	Observed range
Age in years	15.9 (1.06)	14–18
Gender (male)	26 (35.6%)	–
Sleep disturbances	3.32 (3.09)	0–11
Psychological distress	0.86 (0.90)	0–3.81
Childhood Maltreatment		
Overall maltreatment	61.71 (21.78)	25–111
Emotional Abuse	11.73 (5.82)	5–25
Physical Abuse	11.03 (5.90)	5–25
Sexual Abuse	7.78 (5.76)	5–25
Emotional Neglect	14.82 (4.73)	5–24
Physical Neglect	9.32 (4.26)	5–23
Primary Ethnicity		
White	16 (21.9%)	–
Black	17 (23.3%)	–
Other	16 (21.9%)	–
Combination of two or more	24 (32.9%)	–
CPS status		
Crown Ward	50 (68.5%)	–
Society Ward	6 (8.2%)	–
Temporary Care	3 (4.1%)	–
Community Family/Voluntary Care	14 (19.2%)	–
Socioeconomic status		
Well below average	5 (6.8%)	–
Somewhat below average	19 (26.0%)	–
About average	23 (31.5%)	–
Somewhat above average	17 (23.3%)	–
Well above average	9 (12.3%)	–
Number of years in CAS	6.96 (4.44)	1–17
Number of CAS workers	3.23 (1.69)	1–11
Number of home moves in last 5 years	2.10 (1.47)	0–5

Advisory Group to identify issues of emerging practical importance, which the MAP study incorporated into the 2-year testing date. Issues that were identified included physical health areas (sleep, weight, self-injury) and a growing interest in resilience (self-compassion) and, as such, secondary analyses on sub-samples have been conducted on these dimensions. (For a more detailed description of the MAP Longitudinal Study generally, see [Wekerle et al., 2009](#); the PAR model, see [Wekerle, Chen, Leung, Waechter & The MAP Research Team, 2011](#); for other secondary analyses, see [Tanaka et al., 2011](#).)

The current study used a subsample of youth from the larger MAP Longitudinal Study sample (see [Table 1](#) for sample descriptives). Specifically, to be included in the current study, youth had to have participated in the 2-year time-point and have complete data on all of the study variables. The study included 73 individuals. The average age of youth was 15.9 years ($SD = 1.06$; 35.6% boys) at initial testing. The ethnic breakdown of the current sample was 21.9% White, 23.3% Black, 21.9% other, and 32.9% reported being two or more ethnicities. The largest percentage of youth lived with foster families (34%), followed by youth living in a group homes (20.5%), and other arrangements (45%), such as with relatives, on their own, or with a single parent. On average, youth reported living with five other people in their current home ($SD = 2.29$). With respect to childhood maltreatment, the majority of youth (78.1%) endured one or more types of maltreatment above the clinical cutoff (i.e., *moderate to severe* or *severe to extreme* range). In terms of psychological distress, 71.2% of youth did not report any symptoms of psychological distress (e.g., depression, anxiety, hostility) in the clinical range, and the remaining 28.2% of youth indicated experiencing one or more symptoms of psychological distress within the clinical range. The top three most frequently endorsed sleep problems included: taking longer than a half hour to fall asleep (61.6%; item 1), waking up before intended (46.4%; item 3), and having non-restorative sleep (38.4%; item 4). The subsample of youth with complete data on all study variables were not found to significantly differ from the larger MAP sample with respect to age, CAS status, ethnicity, number of CAS workers, living arrangements, severity of childhood maltreatment, or severity of psychological distress. There was a significant difference with respect to gender, in that a greater proportion of girls compared to boys were present in the subsample of MAP youth used in the current study ($\chi^2 = 4.03, p < .05$). Youth in the current sample were found to be involved with CAS for a longer duration of time compared to youth from the larger sample ($t = 2.40, p < .05$).

Measures

The current study used the following measures that were administered as part of the larger MAP Longitudinal Study protocol:

Maltreatment. Experiences of childhood maltreatment were assessed using the Childhood Trauma Questionnaire (CTQ; [Bernstein et al., 1994](#)). The CTQ short-form ([Bernstein, 2003](#)) is a 28-item, retrospective, self-report inventory that provides a screening of histories of abuse and neglect during childhood. The CTQ assesses five types of childhood maltreatment:

Emotional Abuse (e.g., people in my family said hurtful or insulting things to me), Physical Abuse (e.g., people in my family hit me so hard that is left me with bruises or marks), Sexual Abuse (e.g., someone tried to touch me in a sexual way or tried to make me touch them), Emotional Neglect (e.g., I felt loved; reverse scored), and Physical Neglect (e.g., I didn't have enough to eat). The CTQ also includes a 3-item Minimization/Denial Scale for detecting false-negative trauma reports. Responses range from 0 (*never true*) to 5 (*very often true*) and are summed to create scale scores that measure the severity of maltreatment within each type. Within a MAP Longitudinal Study subsample ($n = 52$), the two-week test-retest reliability for the subscales was reported to be moderate (r 's ranging from .52 to .70; [Wekerle et al., 2009](#)). Within the same subsample, the internal validity was found to be high (r 's ranging from .68 to .92; [Wekerle et al., 2009](#)). Further, youth report and CPS worker's rating of childhood maltreatment are significantly correlated for all CTQ subscales (r 's .26 to .58), except for emotional neglect and abuse. An overall severity of childhood maltreatment score was used as the predictor variable for the current study. Scores falling in the moderate to severe, and severe to extreme range, were categorized as being in the clinical range for descriptive purposes. The internal consistency for the overall childhood maltreatment scale in the current sample was high ($\alpha = .92$).

Psychological Distress. Overall psychological distress was measured using the Global Severity Index (GSI) of the Brief Symptom Inventory (BSI; [Derogatis, 1975, 1993](#)), which is reported to be the single best indicator of current distress levels ([Derogatis & Melisaratos, 1983](#)). The BSI is a 53-item self-report inventory validated for adolescents consisting of nine primary symptom dimensions, and is designed to assess for psychological problems experienced in the past week. Items are rated on a 5-point scale of distress ranging from 0 (*not at all*) to 4 (*extremely*). The nine symptom dimensions are as follows: Somatization (e.g., pains in heart or chest), Obsessive–Compulsive (e.g., trouble concentrating), Interpersonal Sensitivity (e.g., your feelings being easily hurt), Depression (e.g., feeling lonely), Anxiety (e.g., feeling tense or keyed up), Hostility (e.g., temper outbursts that you could not control), Phobic Anxiety (e.g., feeling nervous when you are left alone), Paranoid Ideation (e.g., feeling that most people cannot be trusted), and Psychoticism (e.g., the idea that you should be punished for your sins). The GSI total score was created by summing responses on all nine of the symptom dimensions and four additional items that do not load onto the individual dimensions but possess clinical significance (e.g., feelings of guilt). This number is then divided by the number of items to which the individual responded. Scores range from 0 to 4, with higher scores reflecting the presence of greater psychological distress. Within the current sample, the GSI was found to possess good internal consistency with a Cronbach's alpha of .98.

Sleep Disturbances. Current sleep disturbances were measured at the 2-year time-point using 11 self-report questions regarding quality of sleep that were adapted from standardized questionnaires (e.g., [Violani, Devoto, Lucidi, Lombardo, & Russo, 2004](#)). The MAP Advisory Board of CPS members and research staff selected the 11 sleep items as part of the participatory action model. This was a clinically driven request by CPS members to include this information into the study, and the study incorporated this suggestion to be practice-relevant. Participants indicated whether or not ("Yes" or "No") in the last 30 days they suffered from one or more of the 11 sleep problems. The 11 items are as follows: (a) Did it take you more than half an hour to fall asleep? (b) While sleeping, do you wake up often or do you remain awake for more than 30 min? (c) Have you woken up early, that is, more than an hour before you expected to? (d) Have you had non-restorative sleep, that is, as if you hadn't slept at all? (e) Do you have problems staying awake during the day? (f) Do you have irresistible sleep attacks during the day? (g) Have you had an excessive need to sleep (10 h weren't enough)? (h) Have you realized or has someone told you that you stop breathing for a few seconds while you're sleeping? (i) Do you often (more than 3 times a month) have nightmares or dreams that cause a lot of anxiety? (j) Have there been episodes of sleepwalking or of any other unusual behavior during sleep? (k) Do your sleep problems interfere with your ability to function, to study, or at school? Responses on all of the items were summed to create a total sleep disturbance score ranging from 0 to 11. The 11-item measure used in this study was found to have good internal reliability ($\alpha = .86$).

Statistical Analysis

All analyses were carried out using SPSS Version 18.0. Mediation analysis was conducted using [Preacher and Hayes \(2008\)](#)'s SPSS macro script with bootstrapping (INDIRECT) to determine whether the relationship between severity of childhood maltreatment and sleep disturbances in adolescence is mediated by psychological distress. The SPSS macro developed by [Preacher and Hayes \(2008\)](#) is deemed to be superior to the [Baron and Kenny \(1986\)](#) method and the Sobel test ([Sobel, 1982](#)) for estimating indirect effects in mediation models, particularly when working with smaller sample sizes (e.g., under 400), if the estimated mediated effect is small or modest, and to prevent violation of normal distribution assumptions ([Preacher & Hayes, 2004, 2008](#)). The current study requested 1,000 bootstrap samples and used 95% confidence intervals (CI). All analyses included age, gender, ethnicity (White or not) and CPS status (Crown or not) as covariates.

Results

Preliminary Analyses

Mean values and standard deviations, or frequency and percent for categorical data, of all study variables are presented in [Table 1](#) and bivariate Pearson correlations among study variables are presented in [Table 2](#). The results of the correlation

Table 2
Summary of bivariate correlations among primary study variables.

Variable	1	2	3	4	5	6	7
1. Psychological distress	–	–	–	–	–	–	–
2. Sleep disturbances	.50***	–	–	–	–	–	–
3. Overall CM	.50***	.36**	–	–	–	–	–
4. CEA	.53***	.37**	.92***	–	–	–	–
5. CPA	.43***	.20	.82***	.74***	–	–	–
6. CSA	.41***	.23*	.31**	.28*	.50***	–	–
7. CEN	.34**	.27*	.91***	.79***	.57***	.13	–
8. CPN	.47***	.33**	.72***	.54***	.51***	.20	.56***

Note. Overall CM = Overall childhood maltreatment; CEA = childhood emotional abuse; CPA = childhood physical abuse; CSA = childhood sexual abuse; CEN = childhood emotional neglect; CPN = childhood physical neglect.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3
Regression analyses for severity of childhood maltreatment predicting sleep disturbances.

Variable	B	SE	t	p
Age	–0.40	0.33	–1.24	.09
Gender	–1.54	0.75	–2.05	.22
CAS status	–0.58	0.52	–1.10	.27
Ethnicity	–0.50	0.86	–0.58	.57
Childhood maltreatment	0.04	0.02	2.37	.021

$R^2 = .20$.

analysis indicated that overall severity of childhood maltreatment was positively associated with psychological distress and sleep disturbances. Further, psychological distress was positively related to sleep disturbances.

Childhood Maltreatment and Physical Health Outcomes in Adolescence

Prior to conducting the mediation analysis, a multiple regression was run to ensure that severity of childhood maltreatment was predictive of sleep disturbances in adolescence after controlling for age, gender, CAS status, and ethnicity. Severity of childhood maltreatment was found to significantly predict sleep disturbances in adolescence, accounting for 20% unique variance (see Table 3).

Psychological Distress as a Mediator

A simple mediation model, with psychological distress representing the potential mediator, was tested using the SPSS macro script (see Preacher & Hayes, 2008). Fig. 1 shows the unstandardized coefficients for each pathway within the model, and Table 4 shows the unstandardized coefficients for the regression model, including the partial effects of the covariates. As shown in Fig. 1 (path c), severity of childhood maltreatment significantly predicted sleep disturbances ($t = 2.62$, $p < .05$), prior to entering the mediator into the model. The indirect effect of psychological distress was significant, with a point estimate of 0.03, SE 0.01, and a 95% bias corrected and accelerated (BCa) bootstrap CI of 0.01 to 0.06, indicating that psychological distress explains the relation between severity of childhood maltreatment and sleep disturbances in adolescence, even after

Table 4
Results of mediation analyses.

Outcome variable	Predictor variable	B	SE	t	p
<i>Partial effect of control variables on DV</i>					
Sleep disturbances	Gender	–1.14	0.96	–1.64	.106
Sleep disturbances	Age	–0.19	0.33	–0.57	.573
Sleep disturbances	CAS status	–0.76	0.76	–1.01	.318
Sleep disturbances	Ethnicity	–0.15	0.81	–0.18	.855
<i>IV to mediator (path a)</i>					
Psychological distress	Overall CM	0.01	0.00	4.48	<.001
<i>Direct Effects of mediator on DV (path b)</i>					
Sleep disturbances	Psychological distress	2.62	0.81	3.23	<.01
<i>Total effect of IV on DV (path c)</i>					
Sleep disturbances	Overall CM	0.04	0.02	2.62	<.05
<i>Direct effect of IV on DV (path c')</i>					
Sleep disturbances	Overall CM	0.02	0.02	0.90	.373

Note. CM = childhood maltreatment; IV = independent variable; DV = dependent variable; total $R^2 = .32$, $F_{(6,66)} = 5.18$, $p < .001$.

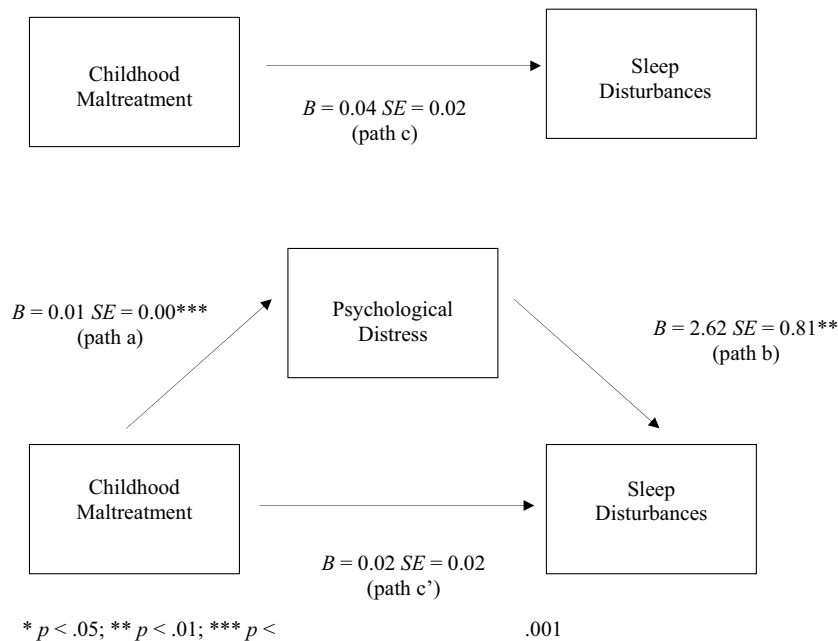


Fig. 1. Mediation model of sleep disturbances.

controlling for age, gender, ethnicity, and CAS status. The direction of the estimates in each pathway (see Fig. 1 and Table 4), suggests that greater severity of maltreatment experienced in childhood, is related to increased psychological distress (path a), which in turn is related to a greater number of sleep disturbances in adolescence (path b). The relation between severity of childhood maltreatment and sleep disturbances in adolescence was no longer significant once the mediator was incorporated into the model (path c'), suggesting that psychological distress functioned as a full mediator. In the final model, the mediator was found to account for 32% unique variance.

Discussion

The present study found that initial severity of childhood maltreatment is predictive of sleep problems in adolescence 2 years later, and that a participant's psychological distress fully explained this relationship. As expected, greater severity of childhood maltreatment was related to increased psychological distress, which in turn was related to a greater number of sleep problems in adolescence. This is the first study to identify psychological distress as key pathway through which childhood maltreatment leads to long-term health-related sequelae in adolescence. This study is also unique in that it incorporates measures of emotional and physical neglect, and not just abuse. The use of an overall childhood maltreatment score, which considers a broad range of types of childhood maltreatment experiences, is consistent with a growing body of literature that is moving away from focusing solely on the influence of unique types of childhood maltreatment, such as sexual abuse (Rodgers et al., 2004). Another strength is the inclusion of both adolescent girls and boys and the representation of a range of ethnicities.

Our findings are consistent with the existing literature examining sleep disturbances in adolescents and adults with histories of childhood maltreatment (Greenfield et al., 2011; Noll et al., 2006). Psychological distress may serve as a mediator in this particular relationship by heightening physical and mental arousal and hypervigilance, thereby interfering with one's ability to achieve quality sleep. Further, sleep is typically restricted to times and places when a person feels safe and secure; thus, feelings of safety and security may have been compromised in children with a history of childhood maltreatment (Noll et al., 2006). Additionally, adolescents with a history of childhood maltreatment may endure an accumulation of subsequent stressful life events, such as revictimization, which could maintain or perpetuate sleep problems (Noll et al., 2006).

The present study has several limitations. First, youth involved in CPS represent a challenging population to follow longitudinally, resulting in participant attrition at the later time-points. Second, CPS-involved youth represent a unique population of individuals who have experienced a history of maltreatment; thus, the result may not generalize to the broader population of individuals who have experienced childhood maltreatment (e.g., those who have unreported childhood maltreatment). Similarly, the generalizability of the results is also constrained by the predominance of Crown Wards and female participants. Third, the MAP Longitudinal Study used self-report measures, raising concern regarding biases. Similarly, the use of a self-report index of sleep problems is limiting. Previous research has suggested that objective measures of sleep, such as polysomnographic (PSG) laboratory protocols, are more accurate at measuring sleep disturbances (Carskadon & Rchtschaffen, 2000). Despite the limitations of this measurement, the simplistic and time-efficient nature of administering

the sleep index allows for the examination of such a construct in relatively large samples. Further, indices such as the sleep index can easily be included within lengthier research protocols where they do not serve as the primary aim. Fourth, the present study only considered the influence of a single mediator. Despite having found support for full mediation, this does not indicate that psychological distress is the only mediator of the relationship between childhood maltreatment and sleep problems, as the findings of the mediation analysis may vary when additional prospective mediators are included or excluded in a model (Preacher & Hayes, 2008). Fifth, the current study examined psychological distress at a global level and not at the symptom level. Specific symptoms dimensions of psychological distress (e.g., depression, anxiety) might explain some of the variance in the current model. Last, due to the temporal ordering of the study variables, definite statements about causality cannot be made. For instance, because sleep problems were not measured during childhood, it is possible that sleep disturbances might actually be leading to increased psychological distress.

There are several suggestions for forthcoming research in the area of childhood maltreatment and health outcomes. An important direction for future research is to replicate these results using a larger, more generalizable sample of individuals with a history of childhood maltreatment. Ideally, future studies should follow participants from adolescence into adulthood in order to clarify the developmental nature of the maltreatment-sleep relationship. Similarly, future studies should consider the use of a comparison group, consisting of individuals who have no history of childhood maltreatment. It will also be important for future research to examine the unique contribution of various childhood maltreatment profiles on physical health outcomes. This will allow researchers to determine whether a particular profile (e.g., experiences physical abuse and sexual abuse) places an individual at greater risk for experiencing future negative health and health-related behaviors. From a developmental psychopathology perspective, prospective research should take into account when the maltreatment occurred, as well as the duration of maltreatment, as health-related outcomes of maltreatment may impart be attributed to the developmental stage at which the maltreatment occurred as well as the relative length of exposure (Margolin & Gordis, 2000). Additionally, future research should take into consideration the influence of multiple stressful episodes, such as repeated removal from the biological home. CPS data linkage is an important consideration for future research; it would allow researchers to both describe the “life” of a youth within the child welfare system that can be considered alongside and in-depth assessment of the youth. Future research should examine the unique contribution of specific psychological problems (e.g., depression, anxiety, post-traumatic stress) as potential mediators of the maltreatment-sleep problems relationship. A fruitful avenue for future research would be to examine these relationships in special populations that are part of CPS, such as children with developmental delays. The variability in the number of sleep problems reported suggests that future research may consider what variables predict the absence of sleep disturbances versus the presence of disturbed sleep. For example, future studies might inquire about medications, as some mood-related medications can impact drowsiness and may promote sleep onset (Lam, 2006).

This study highlights the importance of inquiring about health and health-related behaviors in CPS-involved youth with histories of maltreatment. For instance, interventions should focus on enhancing psychological well-being in this vulnerable population in order to reduce sleep disturbances and improve sleep hygiene. During adolescence, the brain has not yet finished developing and continues to be “remodeled” through processes such as synaptic pruning and myelination (Spear, 2011). Specifically, the prefrontal cortex, responsible for executive functioning, is still going through spades of development during adolescence. Sleep appears to play an important role during times of brain maturation, and as such, being sleep deprived during adolescence can have serious implications for the development of important areas of the brain responsible for higher order thinking and reasoning abilities (Casey, Tottenham, Liston, & Durston, 2005; Dahl & Lewin, 2002). Thus, more interventions are required to help adolescents with sleep disruptions achieve better quality sleep so that the development of higher order brain functioning is not impaired into adulthood, potentially leading to negative outcomes due to poor decision making ability (e.g., poor vocational choices, unplanned families, delinquency). Moreover, adolescence represents an important developmental stage in which to intervene, as it is a period of time in which long-lasting values, habits, and lifestyles related to health are formed (Maggs et al., 1997). Thus, interventions need to focus on lessening the development of health risk behaviors in adolescence by improving the balance between risk factors and protective factors in the youth's environment (Chartier et al., 2010). Further, the results of the present study suggest that it is important to consider a broad range of maltreatment experiences, not such a unique type of childhood experience, when investigating the long-term effects of maltreatment on health outcomes.

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